Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands	))))	IB Docket No. 01-185

CONSOLIDATED OPPOSITION TO AND COMMENTS ON PETITIONS FOR RECONSIDERATION

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Summary

The Commission should reject the unfounded attempts of various petitioners to impose additional unnecessary technical and regulatory burdens on ATC operators that will only serve to negate many of the public interest benefits of ATC.

Inmarsat's proposals are completely unjustified. There is no need for more detailed rules regarding the requirement that ATC operators design their networks with 18 dB of margin for structural attenuation. The requirement is clear on its face and is consistent with standard terrestrial wireless system designs. Inmarsat's concern that the Commission may have underestimated the self-interference impact ATC will have on MSV's next-generation satellite is also misplaced. As MSV demonstrated in its own Petition, the Commission should base any restrictions on terrestrial reuse of L-band spectrum on limiting the *intersystem* impact on Inmarsat satellites, not the self-interference impact on MSV's satellite. Inmarsat's stated concerns about adjacent channel interference are particularly absurd. The out-of-channel emissions limit the Commission imposed would permit tens of millions of ATC mobile terminals to operate simultaneously without causing any harmful interference to Inmarsat. Finally, Inmarsat submitted data for two types of its user terminals that purports to show their susceptibility to overload from MSV ATC base station operations. In fact, the data pertaining to the Inmarsat land-based terminal has nothing to do with overload and is otherwise deficient, and the data pertaining to the Inmarsat airborne terminal assumes that the interference is a continuous wave signal, which is inapplicable to MSV's system operations.

The concerns raised by some terrestrial wireless interests are essentially a further repetition of proposals they have repeated relentlessly for the past two years, many of which are also completely irrelevant to MSV's L-band system. As MSV has demonstrated, its proposed use of ATC does not sacrifice any capacity on its satellite system. Therefore, it is unnecessary to

impose any gating factors on MSV's system that would attempt to regulate how ATC impacts satellite capacity. Similarly, the Telcordia study, which purports to show that terrestrial operations can be conducted independently of the satellite system's operations, is inapposite to MSV's system design, which is based on inter-cell frequency reuse (between the satellite and ATC) and not the intra-cell reuse that is assumed by Telcordia. The Commission should also deny Cingular's request that the Commission clarify that "component kits" fail to satisfy the dual-mode safe harbor for the "integrated service" gating factor. An ATC terminal that otherwise contains the entire satellite-mode protocol, but requires a separate link booster (an external power amplifier and bigger antenna element) to close the satellite link, is a reasonable way for MSV to provide integrated services using currently-operational, lower-power satellites.

MSV supports the petition by the GPS Industry Council, urging the Commission to adopt the out-of-band emission limits for L-band ATC user terminals and base stations that MSV and the GPS Industry Council jointly proposed to the Commission in July 2002. In order to ensure adequate protection of GPS and to maintain the principle of competitive parity, the Commission should apply these out-of-band emission limits to all ATC providers.

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Technical Certification

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CONSOLIDATED OPPOSITION TO AND COMMENTS ON PETITIONS FOR RECONSIDERATION

Mobile Satellite Ventures Subsidiary LLC ("MSV"), pursuant to Section 1.429(f) of the Commission's rules, 47 C.F.R. § 1.429(f), hereby files this Consolidated Opposition to and Comments on Petitions for Reconsideration of the *Order* in the above-captioned proceeding in which the Commission permitted Mobile Satellite Service ("MSS") operators to deploy an Ancillary Terrestrial Component ("ATC").

Background

ATC Order. In February 2003, the Commission completed two years of deliberation and authorized MSS licensees in the L-band, 2 GHz, and Big LEO bands to integrate ATC into their MSS systems.[1] The Commission took this action because of the many public interest benefits of allowing MSS licensees to reuse their spectrum for terrestrial service, including increased spectrum efficiency; better service by overcoming coverage gaps in urban areas; a service that is

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[1] *See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, Report and Order*, 18 FCC Rcd 1962, FCC 03-15, IB Docket No. 01-185 (February 10, 2003) ("*ATC Order*"), *amended by Errata* (March 7, 2003). A summary of the *ATC Order* was published in the *Federal Register* on June 5, 2003. *See* 68 FR 33640 (June 5, 2003). Petitions for Reconsideration of the *ATC Order* were due on July 7, 2003. 47 C.F.R. § 1.429(d). Notice of these Petitions was published in the *Federal Register* on August 5, 2003. *See* 68 FR 46187 (August 5, 2003). Thus, this Consolidated Opposition is timely filed on August 20, 2003, fifteen (15) days after publication in the *Federal Register*. 47 C.F.R. § 1.429(f).

better suited to public safety and national security users; reduced costs, by allowing satellite operators to achieve greater economies of scale; and increased competition. The *ATC Order* reflected the Commission's consistent recent efforts to promote better spectrum management.[2]

Petitions for Reconsideration of the *ATC Order* were filed by MSV,[3] Inmarsat Ventures plc ("Inmarsat"),[4] U.S. GPS Industry Council ("GPS Industry Council"),[5] the Cellular Telecommunications and Internet Association ("CTIA"),[6] Cingular Wireless LLC ("Cingular"),[7]

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[2]*See, e.g., Policies and Rules for the Direct Broadcast Satellite Service, Report and Order*, 17 FCC Rcd 11331, ¶¶ 145-155 (June 13, 2002) (eliminating restrictions on ancillary services provided by DBS operators); *Amendment of Parts 21 and 74, Report and Order*, 13 FCC Rcd 19112 (1998) (allowing MDS/ITFS licensees to deploy two-way systems), *recon.*, 14 FCC Rcd 12764 (1999), *further recon.*, 15 FCC Rcd 14566 (2000); *Amendment of Part 2 of the Commission's Rules, First Report and Order and Memorandum Opinion and Order*, ET Docket No. 00-258, FCC 01-256 (Sept. 24, 2001) (allowing MDS/ITFS licensees to provide mobile services with their spectrum); *Service Rules for the 746-764 and 776-794 MHz Bands*, *First Report and Order*, 15 FCC Rcd 476, ¶ 1 (2000) (establishing service rules to afford 700 MHz licensees the flexibility to provide fixed, mobile, and new broadcast-type services in their licensed spectrum in order to enable "the broadcast possible use of this spectrum"); *Amendment of the Commission's Rules to Establish Part 27*, *Report and Order*, 12 FCC Rcd 10785 (1997) (affording WCS licensees the flexibility to provide fixed, mobile, and radiolocation services as well as satellite digital audio radio service (DARS) in their licensed spectrum); *Geographic Partitioning and Spectrum Disaggregation by CMRS Licensees*, *Report and Order and Further Notice of Proposed Rulemaking*, 11 FCC Rcd 21831 (1996) (allowing broadband PCS licensees to partition and disaggregate spectrum in order to provide licensees with the flexibility to determine the amount of spectrum they will occupy and the geographic area they will serve); *see also Space Data Corporation, Petition for a Declaratory Ruling*, *Memorandum Opinion and Order*, DA 01-2132 (Chief, Wireless Telecommunications Bureau, Sept. 12, 2001) (authorizing a terrestrial wireless licensee to operate paging repeaters from a network of high-altitude balloons).

[3]*See* Mobile Satellite Ventures Subsidiary LLC, Petition for Partial Reconsideration and Clarification, IB Docket No. 01-185 (July 7, 2003) ("*MSV Petition*").

[4]*See* Inmarsat Ventures plc, Petition for Reconsideration and Clarification, IB Docket No. 01-185 (July 7, 2003) ("*Inmarsat Petition*").

[5]*See* U.S. GPS Industry Council, Petition for Reconsideration, IB Docket No. 01-185 (July 7, 2003) ("*GPS Industry Council Petition*").

[6]*See* Cellular Telecommunications and Internet Association, IB Docket No. 01-185 (July 7, 2003) ("*CTIA Petition*").

[7]*See* Cingular Wireless LLC, Petition for Reconsideration, IB Docket No. 01-185 (July 7, 2003) ("*Cingular Petition*").

The Boeing Company ("Boeing"),[8] and the Society of Broadcast Engineers, Inc. ("SBE").[9] This response focuses on the petitions of Inmarsat, CTIA, Cingular, and the GPS Industry Council.

Inmarsat has been concerned with the possibility of harmful interference to its satellite operations in the L-band where MSV operates. Its petition seeks to increase the restrictions on ATC operations. CTIA, whose members provide terrestrial wireless service, and Cingular, which provides such service, have been concerned about satellite licensees being permitted to use their spectrum to provide terrestrial service without first going through a competitive licensing process. Their petitions seek to make it more difficult for MSS licensees to operate ATC by imposing new gating requirements. Cingular also continues to argue that it is inefficient for MSS licensees to operate ATC. The GPS Industry Council asks the Commission to adopt the out-of-band emission limits for L-band ATC mobile terminals ("MTs")[10] and base stations that MSV and GPS Industry Council jointly proposed to the Commission in July 2002.

Discussion

I. THE COMMISSION SHOULD DENY INMARSAT'S PETITION IN ITS ENTIRETY

Inmarsat's Petition is a transparent attempt to impose additional, unnecessary technical and regulatory burdens on L-band ATC operators to further inhibit ATC in the L-band. Inmarsat

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[8] *See* The Boeing Company, Petition for Reconsideration, IB Docket No. 01-185 (July 7, 2003). Boeing's Petition for Reconsideration addresses an issue relevant to ATC applicants in the 2 GHz MSS band. MSV takes no position on Boeing's Petition.

[9] *See* Society of Broadcast Engineers, Petition for Reconsideration, IB Docket No. 01-185 (April 4, 2003). SBE's Petition for Reconsideration addresses issues relevant to ATC applicants in the Big LEO MSS band. MSV takes no position on SBE's Petition.

[10] Consistent with the terminology used by the Commission in the *ATC Order*, throughout this Opposition, the term "mobile terminal" ("MT") is used to refer to a user terminal that communicates with an MSS ATC system. *See ATC Order,* Appendix C1 n.14. The term "mobile earth terminal" ("MET") is used to refer to a user terminal that communicates only with an MSS satellite.

has not offered any valid reason for the Commission to adopt its proposals for reconsideration and MSV urges the Commission to deny Inmarsat's Petition in its entirety.

A. The Requirement that L-band ATC Operators Design Their Networks with 18 dB of Margin for Structural Attenuation Is Reasonable and Clear

Inmarsat asks the Commission to clarify Section 25.253(a)(8) of the rules which requires applicants for ATC in the L-band to demonstrate that the cellular structure of their ATC network design includes 18 dB of link margin allocated to structural attenuation. 47 C.F.R. § 25.253(a)(8); *Inmarsat Petition* at 7-11. Inmarsat contends that there is no practical method to ensure that this 18 dB of link margin is used only to overcome structural attenuation when a MT is located indoors and that it will not be used to extend a base station's range when a MT is located outdoors. *Inmarsat Petition* at 7-11. To address this concern, Inmarsat asks the Commission to require an L-band ATC applicant to provide (i) a full description of the ATC architecture it will use to comply with the ATC rules; (ii) a full and detailed demonstration that the cellular structure of the ATC network design includes 18 dB link margin allocated to structural attenuation; and (iii) an appropriate showing that the 18 dB link margin is used only for indoor service. *Id.* at 11.

Despite Inmarsat's concern, the requirement that ATC operators design their networks with 18 dB of margin for structural attenuation is clear on its face and easily enforceable. As discussed in Appendix A, there are well-accepted principles of mobile system engineering that ensure that 18 dB of link margin is allocated to structural attenuation. *See* Appendix A. Inmarsat's request that the Commission require applicants for L-band ATC authority to make a "full and detailed" demonstration of how they will design their networks with 18 dB of link margin for structural attenuation is best addressed in reviewing a specific application for ATC

authority. Inmarsat will have an opportunity to comment on applications for ATC authority.[11] To the extent Inmarsat believes that a particular ATC application is deficient, Inmarsat will be able to make its positions known to the Commission. At this point, Inmarsat's concerns are merely speculative and do not present a sufficient basis on which to amend or clarify the Commission's rules.

B. Adopting an Additional Rule Regarding Extension of ATC Cell Coverage Is Unnecessary

Inmarsat expresses concern that ATC networks will be designed with little in-building penetration margin at the edge of a cell to cover the largest area with the fewest base stations. *Inmarsat Petition* at 9. Inmarsat claims that such ATC architecture requires MTs to use increased power levels at the edge of cells, thus increasing interference to Inmarsat's satellites. *Id.* Inmarsat notes that the Commission addressed this concern in the *ATC Order* by stating that "MSS licensees shall not extend the coverage area of any ATC cell beyond the point where an ATC MT could operate at the edge of coverage of the ATC cell with a maximum EIRP of -10 dBW." *Id.* at 9-10 (citing *ATC Order* ¶ 142). Inmarsat asks that the Commission codify this requirement in its rules and clarify that the appropriate maximum EIRP is -18 dBW, not -10 dBW. *Id.* at 10.

The Commission should reject Inmarsat's request that the Commission codify its requirement regarding extension of ATC cell coverage because the Commission has already codified this principle in Section 25.253(a)(8) by requiring ATC operators to design their

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[11] *See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, Order on Reconsideration*, FCC 03-162, IB Docket No. 01-185 (July 3, 2003) ("*ATC Sua Sponte Order*") (adopting 47 C.F.R. § 25.117(f)).

networks with 18 dB of margin for structural attenuation. 47 C.F.R. § 25.253(a)(8).[12] Inmarsat offers no reason for the Commission to adopt two different rules that contain the same restriction on ATC deployment.

C. The Peak Gain of MSV's Satellite Receive Antenna Should Not Impact the Commission's Uplink Interference Analysis

Inmarsat argues that the Commission underestimated the self-interference impact ATC will have on MSV's next-generation satellite because the Commission assigned a value of 41 dBi, rather than 42.5 dBi, for the peak gain of the receive antenna of MSV's next-generation satellite. *Inmarsat Petition* at 11-12. Inmarsat calculates that this 1.5 dB increase in antenna gain reduces the terrestrial reuse factor in the L-band from 1725 to 1221. *Id.* at 12.

Despite Inmarsat's claim, it is irrelevant that the Commission may have underestimated the self-interference impact ATC will have on MSV's next-generation satellite by assuming an incorrect parameter for the peak gain of MSV's satellite receive antenna. As MSV has demonstrated in its Petition, the Commission should not base any restrictions on terrestrial reuse of L-band spectrum on limiting self-interference to MSV's next-generation satellite. *MSV Petition* at 10-12. Rather, MSV has demonstrated that the Commission should base any restrictions on terrestrial co-channel reuse of L-band spectrum on limiting the *intersystem* impact on Inmarsat satellites to a level of no more than 6% $\Delta T/T$. *Id.* at 12-14 and Appendix A. By protecting Inmarsat satellites from co-channel ATC to this level, the Commission will ensure that Inmarsat satellites do not suffer harmful interference while at the same time allowing L-band

[12]In the *ATC Order*, the Commission stated that an MSS licensee shall not extend the coverage area of any ATC cell beyond the point where an ATC MT could operate at the edge of coverage of the ATC cell with a maximum EIRP of -10 dBW. *ATC Order* ¶ 142. MSV agrees with Inmarsat that "-10 dBW" is a typo and the sentence should instead state an EIRP of "-18 dBW." *Inmarsat Petition* at 10.

spectrum to be reused in a more efficient and robust manner. *Id.*[13] Because intersystem impact, rather than self-interference, should be the basis for adopting any restrictions on terrestrial reuse of L-band spectrum, Inmarsat's claim that the Commission underestimated the self-interference impact from ATC is not relevant.

Inmarsat is also wrong when it argues that the Commission must maintain its cap on the self-interference impact from ATC to MSV's next-generation satellite to a level of 6% ΔT/T (*i.e.*, 0.25 dB) to ensure that the L-band continues to be available for high-quality MSS and is not gradually transferred to terrestrial services. *Inmarsat Petition* at 13-15. As MSV demonstrated in its Petition, if the Commission were to allow co-channel L-band ATC MTs to impact Inmarsat-4 satellites at a level of 6% ΔT/T, the impact on MSV's currently proposed next-generation satellite, assuming an antenna gain of 41 dBi, would scale proportionally to 51% ΔT/T. *MSV Petition* at 10-11. If MSV did nothing to mitigate the effect of a 51% ATC-induced ΔT/T, it would deplete MSV's satellite link margin by 1.8 dB. *Id.* at 11. If a peak antenna gain of 42.5 dBi is assumed for MSV's next-generation satellite, the self-interference impact from ATC increases to 73% ΔT/T, which amounts to a 2.4 dB loss in available link margin if no signal processing measures are taken. MSV is designing its next-generation satellite system with ATC

[13]MSV has demonstrated that the Commission can authorize a co-channel terrestrial reuse factor of 14,785 in the L-band while still protecting Inmarsat-4 satellites to a level of 6% ΔT/T. *MSV Petition* at 9-15 and Appendix A. On those frequencies where MSV does not operate co-channel with Inmarsat, co-channel restrictions cannot rationally be imposed because there is *ipso facto* no possibility for co-channel interference. When there is no intra-hemisphere co-channel Inmarsat satellite receiver to be affected by the operation of certain frequencies of an MSV L-band ATC, there is no technical basis to impose co-channel limits on those non-co-channel frequencies of the MSV L-band ATC. Non-co-channel ATC operations should be subject only to out-of-channel emission limits, as the Commission did in adopting rules for 2 GHz and Big LEO ATC operators. To the extent the assignment of L-band frequencies remains dynamic, MSV is willing to assume the risk that a portion of its non-co-channel frequencies with Inmarsat may become co-channel in the future and thus become subject to co-channel restrictions.

interference mitigation signal processing at both the satellite and the gateway that will significantly reduce the self-interference impact of ATC. *Id.* These interference mitigation signal processing techniques will reduce the self-interference impact of ATC to a level no greater than 25% ΔT/T, which amounts to less than one dB loss in link margin. This is perfectly acceptable for a system such as MSV's that is being designed with at least 10 dB of link margin. Thus, the self-interference impact from MSV's own ATC operating at a level that will have an intersystem impact on Inmarsat's next-generation satellites of 6% ΔT/T will be relatively minor and will have no adverse effect on MSV's satellite operations. *Id.* Moreover, MSV notes that the Commission did not limit the self-interference impact of ATC on Big LEO or 2 GHz MSS operators. *Id.* at 12. Inmarsat offers no reason why the Commission should limit the self-interference impact of ATC in the L-band but not in the 2 GHz or Big LEO MSS bands.

D. There Is No Reason to Limit the Number of Simultaneously Transmitting ATC MTs to Protect Inmarsat from Adjacent Channel Interference

The Commission should reject Inmarsat's request that the Commission adopt a rule providing that no more than 90,000 ATC carriers may be simultaneously loaded and transmitting in order to protect Inmarsat from adjacent channel interference. *Inmarsat Petition* at 12-13. The Commission has already adopted an out-of-channel emission limit for ATC MTs to protect Inmarsat from harmful interference from adjacent channel emissions. 47 C.F.R. § 25.253(g)(3). In the *ATC Order*, the Commission concluded that the aggregate adjacent channel emissions from 90,000 fully-loaded ATC carriers operating at the out-of-channel emission limit adopted in the *ATC Order* will impact Inmarsat's current and next-generation satellites to a level of 0.001% ΔT/T. *See ATC Order*, Appendix C2, Table 2.1.1.A. This means that the aggregate adjacent channel emissions from <u>9 million</u> fully-loaded ATC carriers will impact Inmarsat's current and next-generation satellites to a level of 0.1% ΔT/T. The Commission's analysis demonstrates that

adjacent channel emissions from millions of simultaneously transmitting ATC MTs will have a negligible impact on Inmarsat's current and future satellites. Accordingly, there is no basis for the Commission to restrict the number of simultaneously transmit ATC MTs.

E. Inmarsat Has Failed to Demonstrate that Its METs Need Additional Protection from Potential Overload Interference from ATC Base Stations

Inmarsat argues that its METs are more susceptible to overload interference from L-band ATC base stations than the Commission assumed in its analysis. *Inmarsat Petition* at 15-17. For the first time in the two-year history of the ATC proceeding, Inmarsat attempts to support its claimed overload threshold by providing test measurements, submitting data from tests performed by NERA on a land-based Global Area Network ("GAN") terminal and a letter from Honeywell purporting to explain the Radio Technical Committee on Aeronautics ("RTCA") standard for the overload threshold of an Inmarsat airborne MET. *Id.* at Exhibits A and B. Inmarsat claims that this data supports an overload threshold of -75 dBm for its land-based METs and -72 dBm for its airborne METs. *Id.* at 16-17 and Exhibits A and B. Based on these revised overload thresholds, Inmarsat asks the Commission to (i) recalculate the restrictions on the locations of L-band ATC base stations to protect Inmarsat METs from overload interference and (ii) establish an "appropriate guardband" to further reduce the potential for overload. *Id.* at 17.

While the data Inmarsat provides concludes that Inmarsat's METs are less susceptible to overload than Inmarsat previously told the Commission,[14] Inmarsat's claims remain highly

[14]Inmarsat previously told the Commission that the appropriate overload threshold for its METs is -90 dBm. *See ATC Order* ¶ 149; Comments of Inmarsat Ventures plc, IB Docket No. 01-185 (October 22, 2001) at Technical Annex at § 3.3.1. In its Petition, Inmarsat now claims that the appropriate overload threshold for its land-based METs is -75 dBm and for its airborne METs is -72 dBm. *Inmarsat Petition* at 16.

exaggerated. As discussed in detail in Appendix B, the test data provided by NERA purporting to support an overload threshold of -75 dBm for Inmarsat land-based METs is grossly misleading because much of the data relates to interference from adjacent channel emissions, which is irrelevant to the issue of overload interference. *See* Appendix B. Moreover, NERA used an interfering signal in its tests that had out-of-channel emission levels that far exceed the limits imposed in the *ATC Order*, thus further distorting the test results. *Id.* The NERA testing data is also incomplete for the following reasons: (i) it lacks a detailed description of the measurement procedure; (ii) there is no indication as to whether the overload threshold level is properly referenced to the input of the receiver front-end; (iii) there is no description of the general bit error rate of the GAN terminal; and (iv) there is no discussion of the specific bit error rate used to determine the threshold of harmful interference. *Id.*

The letter Inmarsat provides from Honeywell purporting to explain that the RTCA standard for the overload threshold of an Inmarsat airborne MET is -72 dBm, not -50 dBm as the Commission assumed, is also misleading and irrelevant because it refers to a section of an RTCA specification that applies only to continuous wave ("CW") interference. *See* Appendix B. MSV's ATC base stations, however, will not radiate CW signals; rather, MSV's ATC base stations will radiate modulated spread-spectrum (noise-like) carriers. *Id.* Thus, the Honeywell letter is simply not relevant to the issue of potential overload interference from L-band ATC base stations. Given that Inmarsat has failed to support its claim that its METs are more susceptible to overload interference than the Commission assumed in the *ATC Order*, the Commission should

reject Inmarsat's request that the Commission establish a guard band and adopt further restrictions on the locations of ATC base stations.[15]

F. The Commission Should Refrain from Imposing Additional Regulatory Burdens on L-band ATC Operators

Inmarsat requests that the Commission require all ATC licensees to keep complete records of the locations of their base stations and the number of MTs they have deployed and to file that information with the Commission every six months so that potentially affected parties can be apprised of the scope of ATC deployment. *Inmarsat Petition* at 23-24. The Commission should dismiss this self-serving and overreaching request. In the *ATC Order*, the Commission has already required L-band ATC licensees to (i) maintain a record of the total number of base stations deployed throughout the United States and to provide this information to the Commission upon request to resolve any interference complaint; (ii) monitor and report annually to the Commission the number of co-frequency base station carriers implemented; and (iii) report

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[15]In its Petition, MSV provided the Commission with data demonstrating that the worst-case overload threshold for an Inmarsat land-based or maritime MET is -43 dBm. *See MSV Petition*, Appendix C. MSV has asked the Commission to revise its downlink interference analysis by using a conservative overload threshold of -45 dBm for Inmarsat land-based and maritime METs, thereby allowing the Commission to authorize at least some L-band base stations to operate with a higher EIRP without increasing the potential for overload interference to Inmarsat METs.

Moreover, in its Comments on the Commission's *Notice of Inquiry* on receiver standards, MSV has urged the Commission to explore the adoption of a "best practices" overload threshold for L-band METs. *See* Comments of MSV, ET Docket No. 03-65 (July 21, 2003) ("*MSV Receiver Standards Comments*"). Under this approach, the L-band MET that is the least susceptible to overload would serve as the "best practices" MET for the band. Manufacturers would still be permitted to produce receivers that are more susceptible to overload, but Inmarsat and other L-band licensees would not be permitted to seek interference protection for a MET to the extent it exceeds the "best practices" overload threshold. MSV has provided data demonstrating that a MET used with MSV's system has an overload threshold of -26 dBm and a NERA MET used with Inmarsat's system has an overload threshold of -30 dBm. *MSV ATC Petition for Reconsideration*, Appendix C at 3. The Commission would also use the "best practices" overload threshold in calculating power levels and separation distances for L-band ATC base stations. *MSV Receiver Standards Comments* at 6-7.

annually to the Commission the peak traffic on the ATC system. *See* 47 C.F.R. § 25.253(c); *ATC Order* ¶ 188. These measures are more than sufficient to resolve any potential interference concerns that may arise from operation of ATC, and Inmarsat provides no reason to conclude otherwise. At bottom, Inmarsat is bluntly asking for access to the commercially sensitive information of its competitors.

The Commission should similarly reject Inmarsat's request that the Commission release a *Public Notice* when an L-band ATC operator tests its first ATC base station, thereby triggering the 18-month period when the L-band ATC operator can deploy only half of its permitted base station carriers. *Inmarsat Petition* at 23-24. MSV considers the date of testing of its first ATC base station to be commercially sensitive information and will seek confidential treatment when informing the Commission.

Finally, the Commission should dismiss Inmarsat's request that the Commission place on *Public Notice* each and every waiver request made by an ATC operator after deployment of ATC. *Inmarsat Petition* at 24. Rather than adopting a strict rule requiring *Public Notice* for all waiver requests, the Commission should maintain the flexibility to determine when a waiver request raises an issue that is significant enough to warrant public comment. Some waiver requests may very well be innocuous and inviting public comment would result in needless delay and a waste of Commission resources.[16]

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[16]Inmarsat also urges the Commission to place all applications for ATC authority on *Public Notice*. *Inmarsat Petition* at 17-23. MSV notes that the Commission has already adopted a rule specifying that all applications for ATC authority will be placed on *Public Notice*. *See ATC Sua Sponte Order* (adopting 47 C.F.R. § 25.117(f)).

II. THE COMMISSION SHOULD DENY THE CTIA AND CINGULAR PETITIONS

A. The Commission Should Not Adopt the Additional Gating Requirements Suggested by CTIA and Cingular

1. Additional Gating Requirements Are Not Needed

Cingular claims that the gating requirements imposed on MSS ATC operators are not as "meaningful" as the limits imposed on the ancillary services provided by other Commission licensees, citing those imposed on Direct Broadcast Satellite ("DBS") operators and digital television ("DTV") broadcasters. *Cingular Petition* at 9.[17] Cingular's claims serve only to show its ignorance of important trends in the Commission's spectrum management policies. The restriction on DBS ancillary services Cingular cites was eliminated in June 2002 as part of the Commission's efforts to promote flexible use of spectrum.[18] In eliminating this restriction, the Commission stated that "relaxation of use restrictions will encourage development of new telecommunications products and services. . . [and] may also increase efficient use of spectrum

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[17]Rather amazingly, Cingular points to MSV as evidence that MSS licensees may not be serious about providing satellite service, citing MSV's recent relinquishment of a license for wing satellites and its request for authority to use an in-orbit rather than an on-ground spare to meet one of its ATC gating requirements. *See Cingular Petition* at 6-7. In fact, MSV is the best example of a company that has been and continues to be committed to providing satellite service. MSV's relinquishment of its wing satellite licenses, as the Commission acknowledged, was due to the inability to coordinate sufficient spectrum for the satellites. *See AMSC Subsidiary Corporation, Order and Authorization*, 13 FCC Rcd 12316, ¶ 15 (March 13, 1998) ("the Commission has acknowledged that it has not been able to coordinate sufficient L-band spectrum for AMSC [the predecessor to MSV] to support a three satellite U.S. system"); *see id.* at ¶ 2 (noting that AMSC "has yet to launch another satellite, and international coordination problems may preclude it from operating additional satellites on the currently authorized frequencies"). The request for permission to use an in-orbit spare is because an in-orbit spare is better than an on-ground spare at serving the Commission's goal of ensuring continuous satellite coverage. Unlike an on-ground spare, an in-orbit spare will be immediately available in the event of a satellite failure thereby avoiding any interruption in satellite service.

[18]*Policies and Rules for the Direct Broadcast Satellite Service, Report and Order*, 17 FCC Rcd 11331, ¶¶ 145-155 (June 13, 2002).

as a whole. Consistent with these policies, we conclude that the public interest is best served by allowing more flexible use of DBS spectrum." *Id.* ¶ 148.[19] The Commission followed a similar policy towards increased flexibility in September 2002 by eliminating all restrictions on the provision on incidental services by cellular providers, including Cingular.[20]

As for DTV, Congress permitted broadcasters to provide "ancillary and supplementary" services with their DTV spectrum but required the Commission to ensure that the provision of these services do not derogate over-the-air television signals. 47 U.S.C. § 336. In implementing this provision, the Commission allowed DTV broadcasters to provide a broad range of ancillary services with their DTV spectrum, including computer software distribution, data transmissions, teletext, interactive materials, aural messages, paging services, audio signals, and subscription video, all of which broadcasters can provide on a broadcast, point-to-point, or point-to-multipoint basis. 47 C.F.R. § 73.624(c). The only restriction placed on use of DTV spectrum for ancillary services is that broadcasters must continue to provide one free over-the-television signal that compares in quality to current analog television and the ancillary services must not derogate this signal.[21] The Commission specifically refused to require these ancillary services to

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[19]The Commission concluded that "DBS licensees are free to provide non-conforming services on as many transponders on any of their satellites for as large a fraction of the time as they wish subject to the Commission's other requirements for DBS." *Id.* ¶ 155.

[20]*Year 2000 Biennial Regulatory Review -- Amendment of Part 22 of the Commission's Rules, Report and Order,* FCC 02-229, WT Docket No. 01-108, 17 FCC Rcd 18401, ¶¶ 64-69 (September 24, 2002). Prior to this decision, the Commission's rules required cellular carriers providing incidental services to ensure that: (1) the costs and charges of subscribers not wishing to use incidental services are not increased as a result of the carrier's provision of incidental services; (2) the quality and availability of primary public mobile service does not materially deteriorate; and (3) provision of such incidental services is not inconsistent with the Communications Act of 1934 or the Commission's rules and policies. *Id.* ¶ 64 (citing 47 C.F.R. § 22.323).

[21]47 C.F.R. § 73.624(c); *see Advanced Television Systems, Fifth Report and Order*, 12 FCC Rcd 12809, ¶ 32 (April 21, 1997).

be "broadcast-related."[22] The Commission concluded that this broad grant of flexibility would facilitate the growth of innovative services to the public, promote the swift acceptance of DTV, encourage entrepreneurship and innovation, and increase efficient spectrum use as well as expand and enhance use of existing spectrum. *Id.* ¶¶ 33-34. The Commission concluded that it "would be contrary to the public interest to handicap broadcasters in providing these services and to deprive consumers of the opportunity to purchase the services they desire." *Id.* ¶ 34. While an apples-to-apples comparison between services as dissimilar as television and MSS is impossible, it is far from apparent that the restrictions placed on the provision of ancillary services by DTV broadcasters are more meaningful and effective than requiring MSS operators to, among other things, operate a satellite providing 50-state coverage, 24 hours, 7 days per week, and to provide an integrated service by offering dual-mode hand sets.

2. The Additional Gating Requirements Suggested by CTIA and Cingular Will Only Impede Development of ATC and Result in Less Efficient Use of MSS Spectrum

The additional gating factors proposed by CTIA and Cingular are unnecessary to ensure that ATC remains ancillary, will only impede the development of MSS and ATC, and will defeat the Commission's goal of promoting efficient use of L-band spectrum. First, insofar as MSV is concerned, it is not necessary to adopt a gating factor which would ensure that ATC does not significantly decrease satellite capacity. *See CTIA Petition* at 4-5; *Cingular Petition* at 9-10 and Engineering Statement. There is no such risk in the case of MSV because the type of dynamic frequency sharing MSV will employ to provide ATC will not result in any significant reduction in satellite capacity. All L-band frequencies will be available simultaneously to both the ATC

[22] *Advanced Television Systems, Fifth Report and Order*, 12 FCC Rcd 12809 at ¶ 30.

and the satellite.[23] While MSV's system would meet a gating factor that restricts ATC from significantly decreasing satellite capacity, such a gating factor would add yet another unnecessary regulatory restriction that may hinder the ability of MSS ATC operators to attract financing.

The Commission should reject the request of CTIA and Cingular that the Commission require ATC MTs to "look first" to the satellite before seeking a terrestrial signal. *CTIA Petition* at 5-6; *Cingular Petition* at 10-11 and Engineering Statement. Such a gating requirement would defeat the Commission's goal of increasing efficient use of MSS spectrum. If an MSS ATC user is located within the coverage area of an ATC base station, the most efficient use of spectrum resources is achieved by allowing the user to access the base station. Satellite capacity should be reserved for those callers who actually need access to the satellite, such as in suburban and rural areas and on waterways where ATC base stations may not provide signal coverage. As the Commission states in the *ATC Order*, "Achieving optimal spectrum usage may require an MSS operator to use ATC even though a particular call might be served via satellite." *ATC Order* ¶ 101. Moreover, as MSV explained in the ATC proceeding, requiring ATC MTs to "look first" to the satellite would necessitate continued Commission oversight and would add a layer of artificial complexity to ATC resulting in operational deficiencies.[24]

Finally, the Commission should dismiss CTIA's request that the Commission "outlaw" ATC-only subscriptions and require the "services and marketing packages offered to users when accessing the ATC component be the same as those offered via the satellite component." *CTIA*

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[23]As discussed above, while ATC will have an impact on satellite link margin, MSV will employ interference mitigation signal processing techniques to ensure that this link margin loss is kept to an acceptable level that will not impact satellite operations in any material way.

[24]*See* Letter from Lon C. Levin, MSV, to Ms. Marlene H. Dortch, FCC, IB Docket No. 01-185 (December 24, 2002).

Petition at 5-6. Imposing such a requirement would again add an unnecessary regulatory restriction that may hinder the ability of some MSS ATC operators to attract financing. The Commission has historically refrained from regulating the prices, service offerings, and marketing practices of CMRS providers, choosing to rely on the marketplace instead.[25] The Commission should follow the same policy for MSS ATC operators. As the Commission notes in the *ATC Order*, the ability to offer ubiquitous service through the use of satellites will be the key feature that distinguishes MSS ATC service offerings from the already highly competitive terrestrial wireless services. *ATC Order* ¶ 35. The market will demand that MSS operators offer comparable services via their satellites that they offer terrestrially. The Commission should refrain from mandating what the marketplace will otherwise likely demand.

B. The Commission Should Clarify that Certain "Component Kits" Satisfy the Dual-Mode Safe Harbor

The Commission should deny Cingular's request that the Commission clarify that all "component kits" fail to satisfy the dual-mode safe harbor for the "integrated service" gating factor. *CTIA Petition* at 11-12.[26] Certain "component kits" are a legitimate way to offer an integrated service.[27] For example, MSV plans to offer ATC terminals for use with its current satellite with a separate antenna booster that enables the terminal to close the link with MSV's

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[25]Regulating "marketing practices," as CTIA suggests, would also raise First Amendment concerns.

[26]In its Petition, Cingular defines a "component kit" as an arrangement whereby an ATC operator would offer at the point of sale a component that enables a terminal to access the MSS satellite. *CTIA Petition* at 11-12.

[27]*See* Letter from Lon C. Levin, MSV, to Ms. Marlene H. Dortch, FCC, IB Docket No. 01-185 (December 24, 2002) (noting that it is critical that the Commission allow equipment to be sold in the form of components rather than as a single integrated handset).

satellite.[28] Besides the antenna booster, all other satellite-mode protocol electronics (hardware and software) that enable the ATC terminal to communicate with the satellite will be integrated into the ATC terminal. Thus, the ATC terminal will be fully satellite enabled. However, because of the relatively low power and small antenna aperture of MSV's current satellite system, a larger terminal EIRP and G/T is required to communicate with the satellite than is needed to communicate with an ATC base station. An MSV ATC user will need to attach the separate antenna booster in order to communicate with the MSV satellite. Every ATC user will receive the antenna booster, thereby ensuring the all users have the ability to access MSV's satellite. Without the ability to offer a separate antenna booster to enable an ATC terminal to communicate with MSV's current satellite, MSV will be forced to offer ATC terminals with large antennas that consumers will not need when they are located within the coverage area of an ATC base station, such as in urban areas. The Commission should clarify that the "component kit" described herein -- whereby all necessary electronics are integrated in the ATC handset but a separate antenna booster is needed to access the MSS satellite – satisfies the dual-mode safe harbor. This type of "component kit" is consistent with the intent of the "integrated service" gating factor that MSS remains first and foremost a satellite service and that ATC remain ancillary.

C. The Conclusions of the Telcordia Study Do Not Apply to the Type of ATC that MSV Will Deploy

Cingular argues that the Commission did not give sufficient weight to the Telcordia Study. *Cingular Petition* at 16-22.[29] The conclusion of the Telcordia Study is that ATC cannot

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[28]An antenna booster is not anticipated to be necessary with MSV's next-generation satellite.

[29]*See* Letter from Brian Fontes, Cingular, and Luisa L. Lancetti, Sprint, to Donald Abelson, FCC, IB Docket No. 01-185 (May 10, 2002) (attaching Telcordia Technologies,

be accomplished through dynamic sharing because such sharing would render the MSS satellite incapable of providing MSS. *Id.* at 18. As a result, the Telcordia Study concludes that MSS operators are likely to provide ATC through band segmentation and thus, according to Cingular, this demonstrates that terrestrial and satellite operations in MSS spectrum can be performed by different entities with no loss in spectrum efficiency. *Id.* Thus, Cingular concludes that the Commission was required to auction licenses for independent terrestrial operations in MSS spectrum. *Id.*

Insofar as MSV's proposed operation of ATC in the L-band is concerned, the conclusions of the Telcordia Study simply do not apply because MSV will not use band segmentation to provide ATC. MSV has proposed an ATC design that employs complete system-wide frequency reuse between the space segment and the ATC. MSV achieves this maximum system-wide efficiency in frequency reuse by linking the frequency reuse cluster of the space segment to the frequencies that may be reused by the ATC as a function of the ATC's geographic location. Within MSV's satellite footprint, all frequencies are available simultaneously to both the ATC and the space segment. Thus, despite Cingular's claims, the dynamic frequency sharing MSV is proposing is far more spectrum efficient than band segmentation and will not reduce the capacity of MSV's satellite. Moreover, permitting independent terrestrial operations in L-band MSS spectrum would eliminate the spectrum efficiencies created by MSV's dynamic frequency sharing and would cause harmful interference to MSV's satellite operations.

MSV previously demonstrated that the Telcordia Study cannot be applied to MSV because the parameters and system model that Telcordia used did not relate to MSV's ATC

"Analysis of Spectrum Sharing Between MSS and Terrestrial Wireless Services" ("Telcordia Study")).

design.[30] Attached as Appendix C is a supplement to this analysis which further explains why the Telcordia Study does not apply to MSV's proposed MSS ATC system. *See* Appendix C. The fundamental reason why the Telcordia Study cannot be applied to MSV is because the MSS ATC system design assumed in the Telcordia Study uses intra-cell frequency reuse between space segment and the ATC whereas MSV's system is based on *inter-cell* frequency reuse between the space segment and the ATC. *Id.*

III. THE COMMISSION SHOULD GRANT THE GPS INDUSTRY COUNCIL'S PETITION, THEREBY ENSURING THAT ATC OPERATIONS DO NOT INTERFERE WITH GPS

MSV supports the GPS Industry Council's request that the Commission adopt the out-of-band emission limits for L-band ATC MTs and base stations that MSV and the GPS Industry Council jointly proposed to the Commission in July 2002. *GPS Industry Council Petition* at 1,5.[31] After extensive internal analysis, MSV has concluded that these out-of-band emission limits are achievable and should therefore be used to provide protection of GPS receivers.

The Commission should ensure that these out-of-band emission limits are applied uniformly to all ATC providers. As the GPS Industry Council notes in its Petition, not one party to the ATC proceeding either objected to the out-of-band emission limits proposed by MSV and the GPS Industry Council or presented alternative limits. *GPS Industry Council* at 3. Thus, in order to ensure adequate protection of GPS and to maintain the principle of competitive parity, the Commission should apply the out-of-band emission limits proposed by MSV and the GPS Industry Council to all ATC providers, including those operating in the Big LEO and 2 GHz bands.

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[30] *See* Letter from MSV to Ms. Marlene, H. Dortch, FCC, IB Docket No. 01-185 (July 29, 2002).

[31] *See* MSV and U.S. GPS Industry Council *ex parte* presentation, IB Docket No. 01-185 (July 17, 2002).

Conclusion

For the reasons stated above, MSV requests that the Commission act consistently with the views expressed herein.

Very truly yours,

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Appendix A

Discussion of Design of ATC with 18 dB of Structural Attenuation Margin and Sharp Signal Cut-Off at Edge-of-Coverage

The purpose of this Appendix is to address the following concerns expressed by Inmarsat in its Petition: (i) the Commission has required L-band ATC operators to design their networks with 18 dB of margin for structural attenuation but there is no practical method to ensure that this 18 dB of link margin is used only to overcome structural attenuation when a MT is located indoors and that it will not be used to overcome structural attenuation when a MT is located outdoors (*Inmarsat Petition* at 7-11); and (ii) ATC networks will be designed with little margin at the edge of a cell to cover the largest area with the fewest base stations, thus requiring L-band MTs to use increased power levels at the edge of cells and thereby increasing interference to Inmarsat's satellites (*Inmarsat Petition* at 9).

Cellular and PCS systems are routinely deployed in urban areas with significant in-building signal penetration margins of 15 to 20 dB. The engineering of an ATC to have 18 dB of structural attenuation margin can be accommodated by the same statistical design techniques that are used today to deploy cellular and PCS systems. In accordance with such design techniques, the link budget of a base station and corresponding terminal equipment is developed and balanced bi-directionally, by taking into account all relevant parameters (*i.e.*, the maximum EIRP of the base station and terminal equipment, the propagation exponent factor appropriate for the environment, multipath fading allowances, receiver sensitivities, antenna and diversity gain factors, etc.) inclusive of an 18 dB signal loss allocated to structural attenuation. The bi-directionally balanced link budget identifies the service radius of a base station. At this service radius, a mobile terminal can communicate with a base station with a specified statistical reliability subject to the specified propagation impairments including the effect of one or more signal attenuating structures that may, in the aggregate, impose 18 dB of signal loss in addition to the propagation loss as defined, for example, by the Cost 231-Hata model. It follows that when a mobile terminal is not subject to any signal attenuating structures (is completely in the clear) it will, subject to closed-loop power control, radiate at a reduced signal level that averages 18 dB lower than its maximum. An ATC service area comprises an ensemble of base stations engineered and deployed based on the above statistical design principles.

In such an environment, comprising an ensemble of ATC base stations, as an active terminal moves from one base station service area to another, the ATC system will continue to provide service to that user terminal via the base station that can nominally provide the highest signal strength and quality (maximum signal-to-noise ratio). As such, a user terminal that is transitioning from the service area of one base station to the service area of another and is operating outside the influence of any signal attenuating structures will, on average, continue to radiate at a reduced signal level of 18 dB less than its maximum.

At the fringes of an ATC service area, the ATC may be configured to avoid serving mobiles that are beyond its engineered service footprint. This may be accomplished in a variety of ways including orienting some sectors of base stations to illuminate areas that are within the ATC service footprint while disabling other sectors that may illuminate areas away from the

ATC service footprint. Such disabled sectors can be configured as receive-only sectors. As such, a user terminal that may be drifting away from the core ATC service footprint, while continuing to communicate with a base station by receiving on the side-lobes of an enabled sector, may transmit back to that base station via the main lobe of a receive-only sector that is oriented toward the user terminal. Subject to this configuration, the forward link to the user terminal will be a much weaker link than the return link, and service to that user terminal will terminate due to forward link breakage much before the user terminal is at a distance that may require it to radiate maximum or near maximum power. Thus, a sharp decrease in base station forward-link signal power can be established at an edge of an ATC service area by judiciously configuring the sectors of base stations that are at or near the edge. The front-to-back ratio of an ATC base station antenna will be, as required by the ATC Rules, at least 26 dB. *See* 47 CFR 25.253 (e). Thus, a base station that is located at (or near) the edge of an ATC service footprint can have at least one of its (typically three) sectors transmit-disabled – the sector(s) that would have pointed away from the ATC service footprint can be disabled in their ability to transmit. For such a base station, a user who is in an unserved area (an area that would have been served by one of the transmit-disabled sectors) will experience significant forward-link signal attenuation (of the order of 25 dB) relative to the base station's boresight maximum EIRP. With a forward link disadvantage of at least 25 dB, the base station service radius in the direction of a receive-only sector will shrink to less than two tenths of what it would have been otherwise. It follows that a user terminal that is within a receive-only sector and outside the influence of any signal attenuating structures will radiate, subject to closed-loop power control, at least 25 dB less than it would have radiated at the edge of a normally engineered ATC sector.

Appendix B

Analysis of Testing Data Provided by Inmarsat of Overload Threshold of Inmarsat Mobile Earth Terminals

Inmarsat in its Petition provides test measurements performed by NERA on a Global Area Network ("GAN") terminal to support its claim that the appropriate overload threshold for an Inmarsat land-based mobile earth terminal ("MET") is -75 dBm. *Inmarsat Petition* at Exhibit A. Inmarsat also provides a letter from Honeywell purporting to clarify that the Radio Technical Committee on Aeronautics ("RTCA") standard for the overload threshold of an Inmarsat airborne MET is -72 dBm, not -50 dBm as the Commission states in the *ATC Order*. *Id.* at Exhibit B. As discussed below, this data is incomplete, misleading, and simply fails to support Inmarsat's exaggerated overload thresholds.

A. NERA Testing Data on Inmarsat GAN Terminal

The testing data Inmarsat provides from NERA on an Inmarsat GAN terminal is incomplete and misleading for the following reasons:

1. The interference levels (thresholds) that NERA measured, corresponding to small frequency offsets (less than 800 kHz) from the desired GAN terminal carrier, reflect adjacent channel interference effects stemming from the interfering GSM signal – **not** the overload threshold of the terminal. NERA has failed to take into account the simple fact that the *ATC Order* specifies much stricter out-of-channel emissions for ATC base stations compared to those of GSM. Thus, a large subset of the reported data is not only irrelevant to the receiver overload issue (because it relates primarily to adjacent channel interference effects), but is also grossly misleading because the GSM interfering signal used by NERA has out-of-channel emissions that far exceed the limits imposed by the Commission in the *ATC Order*. However, it is very interesting to observe that at interference offset frequencies of about 800 kHz or more away from the desired GAN carrier center (where the out-of-channel emissions of the GSM carrier that NERA is using become negligible) NERA measures a receiver overload threshold of about -53 dBm.[32] This overload threshold correlates well with the ARINC specification number of -50 dBm which Inmarsat is attempting to refute.

2. According to the test procedure specified by NERA, Gaussian noise is injected into the GAN terminal to set the receiver C/N_0 operating point at 53.2 dB Hz (before subjecting the terminal to interference). Thus, given the 64 kbps data rate of the GAN terminal, the E_b/N_0 operating point of the receiver is set at 5.1 dB prior to subjecting the terminal to any interference. There is no mention, however, of what Bit Error Rate (BER) was measured at this operating point, nor is there any graph presented specifying the general BER vs. E_b/N_0 performance of the terminal. Among other issues, the testing data does not address the following issues: (i) is the BER of the GAN terminal at the stated E_b/N_0 operating point 10^{-6}, 10^{-9}, or is it

[32]Even this overload threshold is highly misleading given the questionable measurement procedures employed by NERA, as discussed herein.

10^{-3}? And, (ii) how close is this operating point to the "acceptable" performance limit of the terminal?

3. Due to a lack of clarity and the absence of detail regarding the measurement procedure, the point along the RF/IF chain of the GAN terminal at which the measured interference power levels are referenced is not clear. The overload threshold level should be referenced to the input of the receiver front-end (after the antenna element and prior to the LNA stage), but it is not obvious from the NERA report that this is what NERA has done.

4. The specific BER used by NERA to determine the threshold of harmful interference is not identified. NERA only states that the interference power level is adjusted "until bit errors start to occur." This suggests that even a single bit error constitutes a harmful interference threshold for purposes of this test.

B. Letter from Honeywell Purporting to Clarify RTCA Standard for Inmarsat Airborne METs

The letter from Honeywell that Inmarsat provides is misleading. *Inmarsat Petition* at Exhibit B. In that letter, Honeywell acknowledges that -50 dBm is the appropriate input level at which saturation of the LNA may occur for an Inmarsat airborne MET, but goes on to say that "However, saturation of the LNA is not the limiting factor. Other stages or components of a SATCOM receiver down-stream from the LNA are susceptible to saturation at a lower level." *Id.* In support of its assertion, Honeywell cites "RTCA DO-210-D, Section 2.2.4.1.3, [which] states that the receiver must work at its normal sensitivity levels for P-channels and C-channels with interference that is more than 1 MHz off-channel at -72 dBm." *Id.*

What Honeywell omits, however, is that the section of the RTCA study to which it refers applies only to Continuous Wave ("CW") interference. MSV's ATC base stations will not radiate any CW signals. The signals that will be emitted by MSV's ATC base stations will be modulated spread-spectrum (noise-like) carriers. Thus, the Honeywell letter is irrelevant to the issue of overload interference from L-band ATC base stations.

Appendix C

Further Analysis of Why the Telcordia Study Does Not Apply to MSV's Proposed ATC Design

In May 2002, Cingular and Sprint jointly submitted a study prepared by Telcordia claiming to demonstrate that MSS operators would use band segmentation, and not dynamic sharing, to provide ATC because dynamic sharing could render the MSS satellite incapable of providing MSS. *See* Letter from Brian Fontes, Cingular, and Luisa L. Lancetti, Sprint, to Donald Abelson, FCC, IB Docket No. 01-185 (May 10, 2002) (attaching Telcordia Technologies, "Analysis of Spectrum Sharing Between MSS and Terrestrial Wireless Services" ("Telcordia Study")).

In July 2002, MSV demonstrated that the Telcordia Study cannot be applied to MSV's system because the parameters and system model that Telcordia used did not in any way relate to MSV's ATC design. *See* Letter from MSV to Ms. Marlene, H. Dortch, FCC, IB Docket No. 01-185 (July 29, 2002). MSV noted the following: (i) rather than analyzing a geostationary system which MSV operates, Telcordia analyzed a non-geostationary system, which makes intra-system sharing more difficult; (ii) the analysis ignored the use of satellite antenna discrimination to promote reuse; (iii) the analysis assumes that the system will use CDMA technology and postulates intra-cell sharing; and (iv) the analysis assumes that terrestrial operations will necessarily reduce satellite capacity, instead of requiring the use of a modest amount of satellite link margin to accommodate the effect of the ATC as is the case for MSV's proposed ATC system. *Id.*

In October 2002, Cingular and Sprint jointly submitted a letter responding to MSV's July 2002 letter in which they purported to explain why the Telcordia Study is applicable to MSV. *See* Letter from Brian Fontes, Cingular, and Luisa L. Lancetti, Sprint, to Donald Abelson, FCC, IB Docket No. 01-185 (October 1, 2002) ("*Cingular/Sprint October 2002 ex parte*"). MSV hereby responds to each of these claims and provides further support for why the Telcordia Study simply cannot be applied to MSV.

1. *Geostationary (GSO) vs. Non-geostationary (NGSO)*: In response to MSV's point that the Telcordia Study cannot be applied to MSV because Telcordia analyzed an NGSO rather than a GSO system, Cingular and Sprint replied by stating "the Telcordia Analysis quantified interference effects for ATC deployments within the footprint of a given MSS beam, and the results apply whether the beam is stationary or not." *Cingular/Sprint October 2002 ex parte* at 2.

While MSV agrees with this statement, it is irrelevant to MSV because the Telcordia Study is based on intra-beam frequency reuse by the ATC and the space segment -- a configuration whereby both the ATC and a given satellite beam are using the same frequencies over an overlapping geographic footprint. MSV, however, has never advocated intra-beam frequency reuse. Rather, with MSV's system architecture, the ATC is allowed to reuse frequencies that are used by a given satellite beam only over non-overlapping geographic regions where the satellite beam's antenna discrimination is, on average, at least 10 dB. Thus, although

the Telcordia Study is correct for the system assumed in its analysis, the study is inapplicable to MSV's system. Telcordia postulates intra-cell frequency reuse between space segment and ATC whereas MSV's system is based on inter-cell frequency reuse between the space segment and the ATC – two different system architectures that cannot be accommodated by the same analysis.

2. *Satellite Antenna Discrimination*. In response to MSV's point that the Telcordia Study is inapplicable to MSV because the analysis ignored the use of satellite antenna discrimination, Cingular and Sprint respond by stating that "the Telcordia analysis did, in fact, account for antenna beam discrimination. Telcordia assumed that each satellite antenna beam defined a footprint on the earth's surface, and the Analysis focused on the effects of interference between MSS transmissions and signals from ATC cells within that footprint." *Cingular/Sprint October 2002 ex parte* at 2.

It is evident from this response that Cingular and Sprint do not understand how satellite antenna discrimination is relevant to MSV's system. The key point is not whether or not a satellite system comprises a number of spot-beams with discrimination between them in order to enable intra-satellite system frequency reuse – all modern systems deployed or planned have this feature. Rather, the relevant point is whether or not within a given satellite beam the ATC is allowed to reuse the same frequencies that the satellite beam is using. MSV recognized from the beginning that intra-beam reuse of frequencies by the ATC and the satellite is not appropriate and therefore has never advocated such an architecture. Instead, in accordance with MSV's system design, frequencies that are used by a given satellite beam for satellite communications may be reused by portions of the ATC that lie not only outside of the given satellite beam but far enough outside of the given satellite beam at locations where the satellite beam discrimination is, on the average, at least 10 dB. For a GSO satellite system, where the satellite beams are substantially static, this is a realistic design approach. For NGSO systems, however, where the satellite spot beams continuously move at high rates, the ability to coordinate inter-beam frequency reuse between space segment and ATC becomes much more challenging and possibly infeasible due to practical signaling limitations when large populations of ATC user terminals may have to be transferred often from one frequency set to another.

3. *CDMA vs. TMDA*. In response to MSV's point that the Telcordia Study is inapplicable to MSV because the analysis assumed a system design using CDMA technology, Cingular and Sprint respond by stating that "the Telcordia Analysis included an evaluation of TDMA/FDMA technology in addition to CDMA, specifically pointing out major differences between the two sets of technologies. The Telcordia Analysis closed its TDMA/FDMA discussion by concluding: 'As in the CDMA case, a sufficiently large terrestrial deployment of ATC terminals could significantly impact the capacity of the MSS system.'" *Cingular/Sprint October 2002 ex parte* at 2-3.

MSV agrees that there are major differences between the two sets of technologies (TDMA/FDMA and CDMA) and that a sufficiently large terrestrial deployment of ATC terminals based on intra-cell frequency reuse between a satellite cell and the ATC could significantly impact the capacity of the MSS system. MSV's system architecture, however, is based on inter-cell frequency reuse between a satellite cell and the ATC, whereby the ATC never reuses frequencies that are also being used by a satellite cell that includes the ATC in its

footprint. Telcordia's conclusion may, however, apply to NGSO systems that, for the reasons discussed above, may be incapable of satisfying the technical requirements of inter-cell frequency reuse between satellite usage of frequencies and the ATC.

4. *Reduction in satellite capacity vs. reduction in link margin.* In response to MSV's point that ATC will have only a modest impact on MSV's satellite link margin and will have no impact on MSV's satellite capacity, Cingular and Sprint attempt to demonstrate that MSV must necessarily sacrifice at least some of its satellite capacity in order to accommodate the effect of its ATC. *Cingular/Sprint October 2002 ex parte* at 3-4.

ATC will not have any significant impact on MSV's satellite capacity. MSV's next generation satellite system is being designed with a minimum of 10 dB of link margin. Moreover, MSV's satellite receivers will be designed with adaptive interference suppression capabilities and will thus be able to suppress interference caused by the ATC and potentially other sources. As a result, only a fraction of one dB of the available 10 dB of link margin will have to be expended to accommodate any residual noise level increase due to the ATC. Satellite links do not require the same levels of link margin as terrestrial links because the fading on satellite links is Rician with a typically strong line-of-sight component (unlike terrestrial links whose behavior is governed by Rayleigh fading with typically no line-of-sight component). Thus, whereas 6 dB or more of fading margin is typically allocated to terrestrial links to accommodate the effects of Rayleigh fading, 3 dB of link margin, or less, suffices in satellite links to accommodate the effects of Rician fading.

TECHNICAL CERTIFICATION

I, Dr. Peter D. Karabinis, Vice President & Chief Technical Officer of Mobile Satellite Ventures Subsidiary LLC ("MSV"), certify under penalty of perjury that:

I am the technically qualified person with overall responsibility for preparation of the technical information contained in the foregoing "Consolidated Opposition to and Comments on Petitions for Reconsideration." The information contained in the "Consolidated Opposition to and Comments on Petitions for Reconsideration" is true and correct to the best of my belief.

Dr. Peter D. Karabinis
Vice President & Chief Technical Officer

CERTIFICATE OF SERVICE

I, David Konczal of the law firm of Shaw Pittman LLP, hereby certify that on this 20th day of August 2003, served a true copy of the foregoing "Consolidated Opposition to and Comments on Petitions for Reconsideration" by first class United States mail, postage prepaid, upon the following:

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